

Bridge No. 92101  
Spanning Pike River and County Highway 373  
Embarrass Vicinity  
St. Louis County  
Minnesota

HAER No. MN-88

HAER  
69-EMBA.V  
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record  
National Park Service  
Department of the Interior  
Denver, Colorado 80225-0287

HISTORIC AMERICAN ENGINEERING RECORD

BRIDGE NO. 92101

HAER  
MINN  
69-EMBA.V  
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Location: Spanning Pike River at County Road 373, Embarrass Vicinity, St. Louis County, Minnesota

USGS Quad: Biwabik NE, Minnesota (7.5 Minute Series), 1984

UTM Coordinates: 15.551330.5278460

Construction Dates: 1905, 1944

Present Owner: St. Louis County

Present Use: Vehicular highway bridge

Significance: Constructed in 1905 at another location in St. Louis County, Bridge No. 92101 was moved to its present site in 1944. An early example for Minnesota of a rigid-connected low Warren truss, the bridge is also notable as a rare, surviving, low-truss design of A.Y. Bayne and Company of Minneapolis, a major regional bridge builder of the early twentieth century.

Historian: Jeffrey A. Hess

Project Information: In the fall of 1996, the St. Louis County Highway Department plans to use federal funds to replace Bridge No. 92101 by building a new highway crossing in its immediate vicinity. Since Bridge No. 92101 is eligible for listing in the National Register of Historic Places, the Minnesota State Historic Preservation Office has determined that this action will have an adverse effect on the structure's historical significance. In accordance with its responsibilities under the Historic Preservation Act of 1966 and Section 4(f) of the Federal Highway Code, St. Louis County has agreed to relocate the bridge to a more suitable site and to document its historical and engineering significance according to the standards of the Historic American Engineering Record (HAER). In September 1996, the county commissioned Hess Roise and Company of Minneapolis to prepare the HAER documentation. On a sub-contract basis, Jerry Mathiason of Minneapolis served as Project Photographer. The study was completed in November 1996.

Located in northeastern Minnesota, Bridge No. 92101<sup>1</sup> crosses the Pike River in Section 25 of Pike Township in rural east-central St. Louis County (see Figure 1). The bridge carries an unpaved north-south route officially designated as County Road 373, but once generally known as Heitala Road.<sup>2</sup> This thoroughfare, measuring not quite one mile in length, originates on the south at County Highway 21, a major east-west paved route, and it terminates at a small farmstead just north of the bridge.

Neither the farmstead nor Heitala Road appear on a township map published in 1916.<sup>3</sup> Their absence, however, is not surprising. Because of its thin soil, intemperate climate, and short growing season, this area of St. Louis County was among the last regions in Minnesota to attract homesteaders. Pike Township was not officially organized until 1904, and as late as 1920, it was still considered to be "in its initial stage of agricultural development."<sup>4</sup> According to the present owner of the Heitala Road farmstead, the original buildings at the site (which have been demolished) dated from the 1920s.<sup>5</sup> Since Heitala Road served the farmstead as an extended driveway, presumably it and its Pike River crossing were also built

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<sup>1</sup> The Minnesota Department of Transportation lists the structure in its state-wide bridge inventory as No. 92101; the St. Louis County Highway Department refers to it as No. L-6-25-1. Since the state's numbering system appears to be as old as the county's, and is more widely used, we have adopted its designation as the structure's "historic name."

<sup>2</sup> "Piling Plan" n.d., in Bridge No. L-6-25-1 File, St. Louis County Highway Department, Duluth, Minnesota.

<sup>3</sup> *Plat Book of the State of Minnesota* (Rockford, Ill.: W.W. Hixson and Company, 1916), 19.

<sup>4</sup> *Duluth and St. Louis County Minnesota*, vol. 2 (Chicago and New York: The American Historical Society, 1921), 722.

<sup>5</sup> George Waisanen, interview with Jeffrey A. Hess, 23 September 1995.

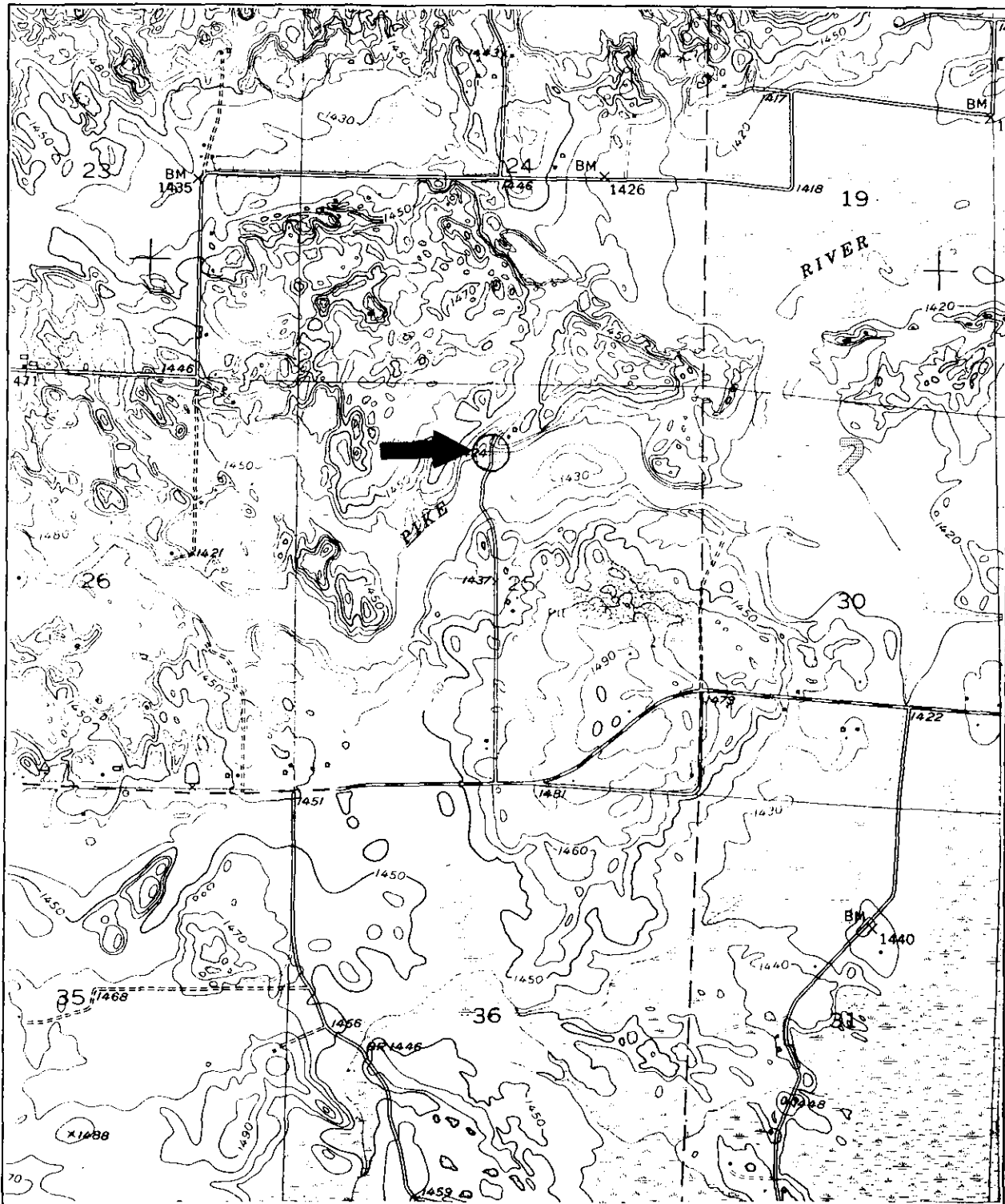


Figure 1: Location map of Bridge No. 92101, Pike Township, St. Louis County, Minnesota.  
(Source: USGS Quad Biwabik NE, Minnesota, 7.5 Minute Series, 1984.)

in the 1920s.

The original Heitala Road bridge survived for a relatively short time. In April 1944, the county highway department made plans for its replacement. This project, characterized at the time as "bridge repair and maintenance," called for a new substructure of treated wood piling and a recycled superstructure in the form of a 49-foot-long, three-panel, steel, Warren low truss salvaged from another location in the county. According to a notation on the project's survey sheet, construction was scheduled to begin during the Pike River's "low water stage[,] July or August."<sup>6</sup> The rebuilt crossing, known as Bridge No. 92101, opened to traffic before the end of 1944.<sup>7</sup>

Although the salvage and reuse of steel highway trusses was a common practice in Minnesota, it is questionable whether the superstructure for Bridge No. 92101 would have been recycled for highway use if the exigencies of World War II had not made structural steel such a scarce commodity for civilian construction projects. Originally built in 1905 by A.Y. Bayne and Company of Minneapolis, the low truss employed a light-weight design that had been banned for highway use by the Minnesota State Highway Commission (SHC) when

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<sup>6</sup> J. Turjo, "Report of Bridge Survey on Bridge No. L-6-25-1," April 1944; Wheeler Lumber Bridge and Supply Co., Invoice to St. Louis County Highway Department, 18 May 1944; both items in Bridge No. L-6-25-1 File. According to the 1944 Survey Report, the truss originally stood on "Ajax Road." Apparently, this thoroughfare has since been vacated or renamed, for county highway department staff were unable to determine its location. The St. Louis County Commissioners Proceedings for October 1905 does note that the "bid of A.Y. Bayne and Co. of Minneapolis, Minnesota, [is hereby accepted] for furnishing all labor and material for constructing in place the substructure and superstructure of a certain steel bridge . . . over Talmadge River"; in St. Louis County Courthouse, Duluth.

<sup>7</sup> Minnesota Department of Transportation, "Structure Inventory," 16 July 1990, in Bridge No. 92101 File, Bridge Division, Minnesota Department of Transportation, St. Paul, Minnesota.

it issued the state's first comprehensive code for bridge construction in 1912.<sup>8</sup>

According to the SHC's specifications, all steel truss highway bridges were to have upper chords of "boxed" configuration -- a type of heavy, built-up construction that usually employed a cover plate and paired channel sections. In contrast, the upper chords of Bridge No. 92101 -- as well as its diagonals, verticals, lower chords, and sway bracing -- consisted of paired, relatively light-weight angle sections riveted together to form a T-shaped cross section. Bridge No. 92101 was obsolete in terms of other SHC specifications as well. Its roadway width was 15 feet, instead of the prescribed 16 feet; its deck was wood rather than concrete; and its rolled I-beam stringers rested on top of the floor beams rather than being rigidly attached to them.

When the St. Louis County Highway Department rebuilt the Heitala Road crossing in 1944, its staff attempted to remedy some of the structural deficiencies of the salvaged truss by means of undercarriage bracing. The method employed had a jerry-built quality typical of the war years. Steel plates -- four in all -- were bolted to the ends of the structure's two floor beams, so that the plates hung vertically down from the floor beams' bottom flange. The bottom of the plates were then supported by two steel rods bolted to the truss webs' lower ends. Each tie rod was equipped with a turnbuckle to adjust the tension of the bracing.

Neither the relocation or re-erection of Bridge No. 92101 materially affected the

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<sup>8</sup> The bridge's date and builder are identified by metal plaques attached to the structure's northwest and southeast end posts, as verified by the author during a site inspection conducted on 23 September 1995. Concerning the SHC's bridge regulations, see Minnesota State Highway Commission, *Standard Specifications for Steel and Concrete Highway Bridges* (Minneapolis: The Thos. A. Clark Company, 1912).

structure's original fabric. Bridge No. 92101 is still readily identifiable as a rigid-connected Warren low truss. As such, it is the state's earliest, surviving, documented example built expressly for highway traffic.<sup>9</sup> The structure is also notable as a highly representative, low-truss design of A.Y. Bayne and Company, a major regional bridge builder of the early twentieth century.

Before the Minnesota State Highway Commission began requiring the use of its standardized bridge plans in 1912, local governments usually relied on private companies to design and erect their highway bridges. During the first decade of the twentieth century, when "Good Roads" advocates were succeeding in upgrading the country's transportation infrastructure, the bridge business became quite lucrative, and several bridge-building companies set up shop in Minneapolis. As historian Fredric L. Quivik has demonstrated, many of these firms were descended from a bridge-building partnership organized by Seth M. Hewett and Commadore P. Jones in 1883. Both Hewett and Jones, for example, would form their own companies, as did their chief sales agent, Alexander Y. Bayne. Bayne first became an independent bridge contractor about 1888, although shortly afterwards he took a management position with the Gillette-Herzog Manufacturing Company of Minneapolis, a major structural steel house which also designed and erected bridges. After Gillette-Herzog merged with 23 other companies nation-wide to form the giant American Bridge Company in

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<sup>9</sup> This judgment is based on the findings of a state-wide historic bridge survey currently being conducted by Hess Roise and Company for the Minnesota Department of Transportation. Although a 1903 low Warren truss is also extant in Minnesota, it was originally built to carry electric street car traffic; see Jeffrey A. Hess, "Final Report of the Minnesota Historic Bridge Survey: Part 1," prepared for Minnesota Historical Society and Minnesota Department of Transportation, 1988, 26.

1903, Bayne once again went on his own, establishing A.Y. Bayne and Company, with headquarters in Minneapolis. For the next decade or so, Bayne built numerous bridges throughout the upper Midwest, securing work as far west as Montana.<sup>10</sup>

In his steel, low-truss designs, Bayne favored the rigid-connected Warren truss, a mid-nineteenth-century bridge type that did not become popular in the United States until the early 1900s, when the development of portable field-riveting equipment facilitated its erection.<sup>11</sup> Bayne built low Warren trusses throughout Minnesota, often employing a paired, angle-section web design that was economical to fabricate and build.<sup>12</sup> Although this particular type of truss detailing had strong advocates in the American engineering community, it fell from favor after 1910, as it became apparent that highway bridges required heavier, more rigid construction to withstand the ever-increasing weight and speed of motorized traffic.<sup>13</sup> Bridge No. 92101 is one of Minnesota's two surviving, authenticated examples of a low Warren truss designed and built by A.Y. Bayne and Company.<sup>14</sup>

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<sup>10</sup> Fredric L. Quivik, "Montana's Minneapolis Bridge Builders," *IA: The Journal of the Society for Industrial Archeology* 10 (Number 1, 1984): 38-45; Robert M. Frame, "Historic Bridge Project," prepared for the State Historic Preservation Office of the Minnesota Historical Society and the Minnesota Department of Transportation, 1985, 15-22, 67.

<sup>11</sup> Donald C. Jackson, *Great American Bridges and Dams* (Washington, D.C.: The Preservation Press, National Trust for Historic Preservation, 1988), 27-29.

<sup>12</sup> Bayne-designed low trusses, similar to Bridge No. 92101, have been authenticated for Waseca County in 1905, McLeod County in 1908, and Fillmore County (two examples) in 1909; see archival files for the following Bridge Nos. L04123, L00338, 007970, and 007976, in State Historic Preservation Office, Minnesota Historical Society, St. Paul. Of these structures, only Bridge No. 007976 in Fillmore County survives.

<sup>13</sup> Milo S. Ketchum, *The Design of Highway Bridges* (New York: The Engineering News Publishing Company, 1908), 199-203.

<sup>14</sup> See note 12 above.

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